

REMARKS

Favorable reconsideration, reexamination, and allowance of this patent application are respectfully requested in view of the following remarks.

Rejection under 35 U.S.C. § 103(a)

In the Office Action, beginning at page 3, Claims 1, 2, and 5 were rejected under 35 U.S.C. § 103(a) as reciting subject matters that are allegedly obvious, and therefore allegedly unpatentable, over U.S. Patent Application Publication No. 2003/0066177, invented by Schnell *et al.* (“Schnell”) in view of U.S. Patent No. 5,240,491, issued to Budinger *et al.* (“Budinger”), for the reasons presented at pages 3-4. Beginning at page 4, Claims 6 and 10 were rejected under 35 U.S.C. § 103(a) as reciting subject matters that are allegedly obvious, and therefore allegedly unpatentable, over *Schnell* and *Budinger* as applied to Claims 1, 2, and 5 above, and further in view of *Stern*, already of record, for the reasons presented at pages 4-5. Beginning at page 5, Claims 7, 8, and 11 were rejected under 35 U.S.C. § 103(a) as reciting subject matters that are allegedly obvious, and therefore allegedly unpatentable, over *Schnell*, *Budinger*, and *Stern*, and further in view of *Schaefer*, already of record, for the reasons presented at pages 5-7. Beginning at page 7, Claim 9 was lastly rejected under 35 U.S.C. § 103(a) as reciting subject matter that is allegedly obvious, and therefore allegedly unpatentable, over *Schnell*, *Budinger*, *Stern*, and *Schaefer*, and further in view of *Van Esch* and *Rafferty*, both already of record, for the reasons presented at pages 7-8.

Applicant respectfully requests reconsideration of these rejections.

This application describes processes and compositions embodying principles of the present invention.

Claim 1 relates to a braze alloy consisting of, in wt.-%: 10-15% Cr, 4.5-6% Al, 0.17-0.3% Y, 8-12% Co, 0-4% W, 2.5-5% Ta, 2.0-3.5% B, with $\text{Cr} + \text{Al} > 15\%$, $\text{Cr}/\text{Al} \leq 3$, and $\text{Al} + \text{Ta} > 7.5\%$, remainder Nickel and impurities.

The prior art, including *Schnell*, *Budinger*, *Stern*, *Schaefer*, *Van Esch*, and *Rafferty*, fails

to disclose, describe, or fairly suggest the combination of features recited in the pending claims.

The Office Action is correct in noting that *Schnell* describes a brazing alloy with a chemical composition that - regarding the Cr-, Co-, W-, Ta-, Al-, B- and Ni- content - overlaps or lies inside the ranges recited in Claim 1, and that *Schnell* is silent about the yttrium content in a range of 0.17 to 0.3 wt%. But *Schnell* is also silent about three other features recited in the combination of Claim 1: “Cr+Al>15%, Cr/Al \leq 3, and Al+Ta>7.5%”. There is no discussion, description, or even a hint in *Schnell* to use these criteria when designing a brazing alloy. The configuration with 11 wt% Cr, 4.5 wt% Al and 3.5 wt% Ta, cited in the Office Action, was selected randomly, and therefore was the product of an impermissible hindsight reconstruction of the claimed combination based solely on Applicant’s own specification. None of the exemplary alloys described in *Schnell*, Nos. 1 to 9 in *Schnell*’s Table 1, is read on by the claimed alloy, as demonstrated in the table below:

Braze Alloy	Cr+Al	Cr/Al	Al+Ta
Claim 1	> 15	\leq 3	> 7.5
No. 1	no	no	no
No. 2	yes	no	no
No. 3	yes	no	no
No. 4	yes	no	no
No. 5	yes	no	no
No. 6	yes	no	yes
No. 7	yes	no	yes
No. 8	no	yes	no

Therefore, *Schnell* neither realized the importance and effect of these three features, nor disclosed Y as an alloying element; and, naturally, *Schnell* did not disclose the specific range of Y (0.17-0.30 wt%). As discussed in this application, (see page 8, last 3 lines), it was an unexpected effect that, with such a high Y content in the brazing alloy, such an enhanced high temperature oxidation resistance could be reached. Furthermore, the yttrium content is balanced with - among others - the Cr/Al ratio of the alloy. The Cr/Al ratio has a maximum 3 as recited in

Claim 1, and the Y content is an adaptation to the specific composition.

The Office Action, recognizing that *Schnell's* alloy is, actually, quite different from that claimed, turns to *Budinger* in an attempt to arrive at the claimed combination. *Budinger* describes an alloy powder mixture for brazing of superalloy articles at high brazing temperatures above about 2300 °F (see Abstract and column 2, lines 41-42). One alloy powder of the mixture is selected from the first group (a high melt alloy) and at least one alloy powder is selected from the second (a low melt alloy) or the third group (a eutectic alloy). The braze material *Budinger* discloses is therefore not a braze alloy at all, but a mixture of at least two alloy powders with a bulk composition range. The differences between “alloys” and “mixtures” are well known to a person skilled in the art, and they are known to be not interchangeable: an alloy is a solid solution of one or more elements in a metallic matrix, and alloys have different properties from those of the component elements, while mixtures are merely physical combinations of disparate things with different compositions and attributes. *Budinger's* low melting alloy is substantially liquid at the preferred brazing temperature for the material, while the high melting alloy remains substantially solid at the brazing temperature (column 2, lines 40-47). According to *Budinger*, high brazing temperatures can be reached with the special mixture.

Budinger discloses some of the materials having Y, but he does not describe the effect of Y in a braze alloy for increasing the oxidation and corrosion resistance. In Table 1, a high melt alloy (HM5) is described by *Budinger* with 0.3 wt% Y, but this alloy has a different Co-, Cr-, and W-content with respect to the claimed alloy. Furthermore, that alloy lacks B and includes additional elements like Mo, Re, and Hf, which influence the properties of the material. In addition, Cr+Al is not >15 wt%. The same is true for embodiment 20 (Table 2), a mixture of 70 % HM3 and 30 % E1, with a bulk composition that contains, among others, 0.2 wt% Y. Cr+Al is <15 wt% (not >15 wt%), and Cr and W are outside the claimed range, while additional elements like Ti, Mo, Nb, Re, and Hf are present. Furthermore, No. 20 also lacks B. In the whole, *Budinger's* describes materials with a composition including Y which do not contain substantial amounts of B (boron is thus only an incidental impurity). *Budinger's* goal is a multi-component braze material with a high melting point using decreased B (and Si).

Therefore, a person of ordinary skill in the art, upon a full and fair reading of the prior art, would not find any rational reason, related to the subject matters of the prior art, to modify the alloy of *Schnell* to arrive at the claimed alloy, at least because *Budinger* does not relate to a single alloy, does not provide any guidance about the effects of Y content in a similar alloy, does not describe the effect of boron content in a similar alloy, and when *Budinger* does describe an alloy including Y, the alloy is nothing like that of *Schnell*, and therefore there is no reason to haphazardly add Y to *Schnell*'s alloy.

The tertiary disclosures of *Stern*, *Schaefer*, *Van Esch*, and *Rafferty* fail to cure the fundamental deficiencies of *Schnell* and *Budinger*, with respect to the combinations of the pending claims, and therefore their further hypothetical combination still would not render the claims unpatentable.

For at least the foregoing reasons, Applicant respectfully submits that the subject matters of Claims 1, 2, and 5-11, each claim taken as a whole, would not have been obvious to one of ordinary skill in the art at the time of Applicant's invention, are therefore not unpatentable under 35 U.S.C. § 103(a), and therefore respectfully requests withdrawal of the rejection thereof under 35 U.S.C. § 103(a).

Conclusion

Applicant respectfully submits that this patent application is in condition for allowance. An early indication of the allowability of this application is therefore respectfully solicited.

If Mr. Mekhlin believes that a telephone conference with the undersigned would expedite passage of this patent application to issue, he is invited to call on the number below.

It is not believed that extensions of time are required, beyond those that may otherwise be provided for in accompanying documents. If, however, additional extensions of time are necessary to prevent abandonment of this application, then such extensions of time are hereby petitioned under 37 C.F.R. § 1.136(a), and the Commissioner is hereby authorized to charge fees necessitated by this paper, and to credit all refunds and overpayments, to our Deposit Account 50-2821.

Respectfully submitted,

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Date: 16 September 2009